**In the Claims**

Please replace all prior versions, and listings, of claims in the application with the following list of claims:

1-10. (Canceled).

11. (Currently Amended) A method [[as claimed in claim 10 including determining potential]] for generating CAD/CAM postures for a tool operating on a body including:

storing a representation of the tool and a representation of said body in a computer;

using a user controlled haptic interface device to control simulated movement of the tool relative to the body;

detecting any collision between the tool and the body for a given posture, including the position on each for each collision, the direction of the collision, and the penetration of the tool into the body;

converting the detected direction, point and penetration for each collision into at least one force vector on the tool;

summing the force vectors for a given posture;

applying said at least one force vector as a corresponding feedback force vector to said interface device, and thus to the user; and

storing a plurality of CAD/CAM postures of the tool to form a posture map, each of the plurality of postures indicating where the tool collides with the body at a working surface of the tool, but does not otherwise collide with the tool, the plurality of postures stored in the posture map subsequently referenceable to determine, at least in part, a force-feedback vector, wherein only CAD/CAM postures which at least meet selected criteria are stored [[and storing only such postures]].

12. (Original) A method as claimed in claim 11 wherein only the best posture for each point on the body is stored.

13. (Currently Amended) A method [[as claimed in claim 10 wherein said representation of the tool includes]] for generating CAD/CAM postures for a tool operating on a body including:

storing a representation of the tool including [[a]] at least one niceness factor, the at least one niceness factor being higher for regions of the tool where contact is desired, and decreasing for regions as a function of desired contact in such regions, and a representation of said body in a computer;

using a user controlled haptic interface device to control simulated movement of the tool relative to the body;

detecting any collision between the tool and the body for a given posture, including the position on each for each collision, the direction of the collision, and the penetration of the tool into the body;

converting the detected direction, point and penetration for each collision into at least one force vector on the tool;

summing the force vectors for a given posture;

applying said at least one force vector as a corresponding feedback force vector to said interface device, and thus to the user; and

storing a plurality of postures of the tool to form a posture map, each of the plurality of postures indicating where the tool collides with the body at a working surface of the tool, but does not otherwise collide with the tool, the plurality of postures stored in the posture map subsequently referenceable to determine, at least in part, a force-feedback vector.

14. (Currently Amended) A method as claimed in claim 13 wherein the at least one niceness factor is zero for regions where contact is undesirable.

15. (Currently Amended) A method as claimed in claim 13 wherein the at least one niceness factor for a posture is the lowest niceness factor for contacts occurring at such posture.

16. (Original) A method as claimed in claim 13 wherein said tool representation is divided into regions, a different region being defined at least at each surface transition of the tool, and wherein a niceness factor is assigned to each region.

17. (Currently Amended) A method as claimed in claim [[10]] 11 wherein said tool representation is divided into regions, a different region being defined at least at each surface transition of the tool, force direction and magnitude being continuous with each said region.

18. (Original) A method as claimed in claim 17 including storing a binary space partition tree representation of the tool for each said region.

19. (Original) A method as claimed in claim 18 including storing a point cloud representation of the body.

20. (Previously Presented) A method as claimed in claim 17 including defining a snap-fit region for said tool around each working surface wherein contact with the second body is desired.

21. (Original) A method as claimed in claim 20 including applying a force to said interface device to urge said tool toward the body when the body and tool are not in contact but the body is in a said snap-fit region of said tool.

22. (Currently Amended) A method as claimed in claim [[10]] 11 wherein a part is being machined from the body and material is being removed from the body in layers, including establishing constraints at a layer boundaries, and detecting collisions between the tool and a selected operative constraint.

23. (Original) A method as claimed in claim 22 including storing implicit equation representations of said constraints and point cloud representation of said tool.

24. (Currently Amended) A method [[as claimed in claim 22]] for generating CAD/CAM postures for a tool operating on a body including:

storing a representation of the tool and a representation of said body in a computer;

using a user controlled haptic interface device to control simulated movement of the tool relative to the body;

detecting any collision between the tool and the body for a given posture, including the position on each for each collision, the direction of the collision, and the penetration of the tool into the body, wherein a part is being machined from the body and material is being removed from the body in layers, including establishing operative constraints at layer boundaries, and detecting collisions between the tool and a selected operative constraint;

converting the detected direction, point and penetration for each collision into at least one force vector on the tool;

summing the force vectors for a given posture;

applying said at least one force vector as a corresponding feedback force vector to said interface device, and thus to the user; and

storing a plurality of CAD/CAM postures of the tool to form a posture map, each of the plurality of postures indicating where the tool collides with the body at a working surface of the tool, but does not otherwise collide with the tool, the plurality of postures stored in the posture map subsequently referenceable to determine, at least in part, a force-feedback vector, wherein collisions are detected between the tool and the part as well as between the tool and the operative [[constraint]] constraints, wherein force vectors are generated for each collision, and wherein said summing step sums and averages force vectors for all collisions.

25. (Currently Amended) A method as claimed in claim [[10]] 11 including defining a desired orientation for said tool, and applying a suitable force to said haptic device to urge the device in a direction to correct any deviation of tool orientation from said desired orientation.

26. (Canceled).

27. (Currently Amended) A system as claimed in claim [[26]] 33 wherein said interface device controls simulated movement of said first body in at least five degrees of freedom; and

wherein said at least one force vector is in the same at least five degrees of freedom.

28-29. (Canceled)

30. (Currently Amended) A system as claimed in claim [[26]] 33, wherein force for a collision is represented at least in part by penetration of the body represented by the implicit representation into the other body.

31. (Currently Amended) A system as claimed in claim [[26]] 33 wherein at least one of said representations is stored as a point cloud representation of the body.

32. (Currently Amended) A system as claimed in claim [[26]] 33 including a niceness factor stored in said at least one memory for at least one feature of said first body;

said processing apparatus utilizing the niceness factor to influence said force vector.

33. (Currently Amended) A system [[as claimed in claim 26]] for controlling the simulated interfacing of a first body controlled by a user with a second body, while providing haptic feedback to the user on such interface including:

at least one memory storing selected representations of said first body and of said second body, and [[including]] a representation [[stored in said at least one memory]] for a guide zone around at least a portion of one of said bodies[[;]], the representation for one of said bodies including an implicit representation and a binary space partition tree and the representation for the other body being a discrete representation;

a user controlled haptic interface device; and

processing apparatus responsive to said interface device for providing simulated movement of the first body relative to the second body, said processing apparatus detecting collisions between the bodies resulting from such simulated movement, including the position on each body of each collision, the direction of the collision, and force for the collision, converting the detected direction, point and force for each collision into at least one force vector, modifying the at least one force vector based on at least one of a plurality of postures stored in a posture map and, feeding back the at least one force vector through said interface device, wherein said processing device [[providing]] provides a force feedback to said interface device to urge the first body toward the second body when the bodies are not in contact but the guide zone of the one body is detected as having the other body therein.

34-35. (Canceled)

36. (Currently Amended) [The method of claim 35,]] A method of providing haptic feedback corresponding to full-body contact between a first object controlled by an interface device and at least one second object, the method comprising acts of:

storing a first three dimensional representation and a second three dimensional representation of the first object and the at least one second objects, respectively, wherein one of the representations includes at least one region defined by a implicit equation and the other representation includes a point cloud and a bounding volume hierarchy;

determining presence or absence of penetration of the first and second representations at each point in the point cloud [[wherein the act of determining a presence or an absence of a penetration includes an act of]], including traversing the bounding volume hierarchy, each successive determination of a presence or an absence of a penetration involving portions of the bounding volume for which the presence of a penetration was determined;

wherein in an event of the presence of penetration of the first and second representations, performing acts of:

computing a vector having a magnitude related to depth of the penetration and a direction related to direction of penetration of each penetration;

computing at least one force vector corresponding to the full-body contact between the first and second object based on at least one of the penetration vectors;

wherein in an event of the absence of penetration of the first and second representations, performing an act of:

computing at least one force vector based on a relationship between the first object and at least one guide zone.

37. (Currently Amended) The method of claim [[35]] 36, wherein a binary space partition tree is associated with the implicit equation representation and wherein the act of determining a presence or an absence of a penetration includes traversing the binary space partition tree.

38. (Currently Amended) The method of claim [[39]] 37, wherein determining a presence or an absence of a penetration includes intersecting iteratively refined portions of the binary space partition tree and the boundary volume hierarchy.

39. (Currently Amended) The method of claim [[35]] 36, wherein at least some of the points in the point cloud representation are vertices in a triangulated surface.

40. (Currently Amended) [[The method of claim 35,]] A method of providing haptic feedback corresponding to full-body contact between a first object controlled by an interface device and at least one second object, the method comprising acts of:

storing a first three dimensional representation and a second three dimensional representation of the first object and the at least one second objects, respectively, wherein one of the representations includes at least one region defined by a implicit equation and the other representation includes a point cloud and a bounding volume hierarchy, and wherein the first three dimensional representation is of the first object and the at least one region includes a plurality of regions defined by a plurality of implicit equations, at least one region having associated with it a

niceness factor related to the desirability of contact between the at least one region and the second object;

determining presence or absence of penetration of the first and second representations at each point in the point cloud;

wherein in an event of the presence of penetration of the first and second representations, performing acts of:

computing a vector having a magnitude related to depth of the penetration and a direction related to direction of penetration of each penetration;

computing at least one force vector corresponding to the full-body contact between the first and second object based on at least one of the penetration vectors;

wherein in an event of the absence of penetration of the first and second representations, performing an act of:

computing at least one force vector based on a relationship between the first object and at least one guide zone.

41. (Currently Amended) [[The method of claim 35,]] A method of providing haptic feedback corresponding to full-body contact between a first object controlled by an interface device and at least one second object, the method comprising acts of:

storing a first three dimensional representation and a second three dimensional representation of the first object and the at least one second objects, respectively, wherein one of the representations includes at least one region defined by a implicit equation and the other representation includes a point cloud and a bounding volume hierarchy, and wherein the first three dimensional representation is of the first object and the at least one region includes a plurality of regions defined by a plurality of implicit equations, and wherein at least one region has associated with it a snap-fit region to urge the first object in a direction to bring the at least one region in contact with the second object when the second object is within the snap-fit region;

determining presence or absence of penetration of the first and second representations at each point in the point cloud;

wherein in an event of the presence of penetration of the first and second representations, performing acts of:

computing a vector having a magnitude related to depth of the penetration and a direction related to direction of penetration of each penetration;

computing at least one force vector corresponding to the full-body contact between the first and second object based on at least one of the penetration vectors;

wherein in an event of the absence of penetration of the first and second representations, performing an act of:

computing at least one force vector based on a relationship between the first object and at least one guide zone.

42. (Currently Amended) [[The method of claim 35,]] A method of providing haptic feedback corresponding to full-body contact between a first object controlled by an interface device and at least one second object, the method comprising acts of:

storing a first three dimensional representation and a second three dimensional representation of the first object and the at least one second objects, respectively, wherein one of the representations includes at least one region defined by a implicit equation and the other representation includes a point cloud and a bounding volume hierarchy, and wherein the second three dimensional representation is of the at least one second object and wherein the at least one guide zone is associated with the second three dimensional representation and includes a snap-fit region to urge the first object in a direction to bring the first object in contact with the second object when the first object is within the snap-fit region;

determining presence or absence of penetration of the first and second representations at each point in the point cloud;

wherein in an event of the presence of penetration of the first and second representations, performing acts of:

computing a vector having a magnitude related to depth of the penetration and a direction related to direction of penetration of each penetration;

computing at least one force vector corresponding to the full-body contact between the first and second object based on at least one of the penetration vectors;

wherein in an event of the absence of penetration of the first and second representations, performing an act of:

computing at least one force vector based on a relationship between the first object and at least one guide zone.

43. (Canceled).

44. (Currently Amended) [[The method of claim 43]] In a virtual three-dimensional environment including a haptic interface device to control a simulated movement of at least one first object with at least five degrees of freedom with respect to at least one static object, the at least one first object represented by one or more geometric regions, a method of generating a posture map of the at least one first object, the method comprising acts of:

selectively storing a plurality of postures of the at least one first object at least at points at which the at least one first object has a posture wherein a portion of at least one geometric region penetrates the at least one static object; and

determining whether to store any give posture of the at least one first object based on at least one of a niceness factor associated with the one or more geometric regions penetrating the at least one static object, and a depth of the penetration of the one or more geometric regions, wherein determining the posture being stored includes choosing the posture having the highest niceness factor associated with the one or more penetrating regions.

45. (Currently Amended) [[The method of claim 43]] In a virtual three-dimensional environment including a haptic interface device to control a simulated movement of at least one first object with at least five degrees of freedom with respect to at least one static object, the at least one first object represented by one or more geometric regions, a method of generating a posture map of the at least one first object, the method comprising acts of:

selectively storing a plurality of postures of the at least one first object at least at points at which the at least one first object has a posture wherein a portion of at least one geometric region penetrates the at least one static object; and

determining whether to store any give posture of the at least one first object based on at least one of a niceness factor associated with the one or more geometric regions penetrating the at least one static object, and a depth of the penetration of the one or more geometric regions, wherein determining the posture being stored includes an act of choosing a posture only when a niceness factor associated with the one or more penetrating regions exceeds a predetermined threshold.

46. (Currently Amended) [[The method of claim 43]] In a virtual three-dimensional environment including a haptic interface device to control a simulated movement of at least one first object with at least five degrees of freedom with respect to at least one static object, the at least one first object represented by one or more geometric regions, a method of generating a posture map of the at least one first object, the method comprising acts of:

selectively storing a plurality of postures of the at least one first object at least at points at which the at least one first object has a posture wherein a portion of at least one geometric region penetrates the at least one static object; and

determining whether to store any give posture of the at least one first object based on at least one of a niceness factor associated with the one or more geometric regions penetrating the at least one static object, and a depth of the penetration of the one or more geometric regions, wherein determining the posture being stored includes an act of determining the posture being stored based on a niceness factor associated with the one or more regions penetrating the at least one static object, and a depth of the penetration of the one or more regions.

47-48. (Canceled)

49. (Currently Amended) [[The posture map of claim 48]] A posture map for generating guide paths for at least one first object, the posture map comprising:

a plurality of postures, each of the plurality of postures associated with a point in a virtual three-dimensional cartesian space where at least one portion of a first representation of the at least one first object in the three-dimensional space penetrates a representation of at least one second object in the three-dimensional space, and representing a desirable posture for the at least one first object at the associated point, each of the plurality of postures including:

a first, a second, and a third location component representing a reference coordinate location of the at least one first object with respect to a first, a second, and a third axis of the cartesian space, respectively; and

a first and a second rotation angle representing a rotation of the at least one first object about the first and second axis, respectively, wherein the first representation is divided into a plurality of regions, each of the plurality of regions having associated with it a niceness factor indicating the desirability of penetration between the region and the at least one second object.

50. (Previously Presented) The posture map of claim 49, wherein the posture at each point in the set of three-dimensional points corresponds to a desired posture of the at least one first object and wherein the posture is chosen based on at least one of a niceness factor associated with at least one penetrating region, and a depth of the penetration of the at least one penetrating region.

51. (Previously Presented) The posture map of claim 49, wherein the posture at each point in the set of three-dimensional points is chosen based on the niceness factor associated with the at least one penetrating region, and a depth of the penetration of the at least one penetrating region.

52-66. (Canceled)